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## PRODUCTION OF HIGH-ALUMINA REFRACTORY AND TIN OXIDE PRODUCTS

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The Research and Development Institute of Glass has organized the production of high-alumina refractories for parts of glass-shaping machines and tin dioxide electrodes.

Many glass producers currently use high-temperature glass melting and implement highly efficient domestic and imported machinery. Increased requirements are imposed on refractory parts of feeders, the demand for which is growing. Refractory materials for feeders have to combine such characteristics as high glass resistance, sufficient thermal stability, and mechanical strength.

The Research and Development Institute of Glass, on the basis of the Refractory Department, organized a production facility for high-alumina refractory materials for feeders of glass-shaping machines and tin dioxide electrodes. In 1999, the production facility was upgraded and reconstructed, and as a consequence, the production of high-alumina parts for feeders increased 5 times.

The existing product range includes over 300 refractory pieces of different sizes and configurations. These are pieces for the upper and lower feeder structures, the working zone of glass-melting furnaces, drop-forming parts, and individual-purpose products. It is possible to manufacture and supply sets of high-alumina refractory pieces for any types of feeders used in domestic or foreign glass-shaping machines. Our high-alumina refractories have as high a glass resistance as foreign products, but lower prices.

The production of high-alumina products is carried out according to the up-to-date technology using the vibro-casting method, and the  $\text{Al}_2\text{O}_3$  content is at least 56%.

Our consumers are factories in all regions of Russia and the CIS countries that produce glass containers, household glass, electromechanical and medical glass, etc.

Due to the increased requirements imposed on the quality of the refractories, machine treatment and stand assembly of feeder bonds is currently carried out at our enterprise.

Product quality is the main criterion for market success, and therefore, the quality control department and the physicochemical laboratory execute input control of raw materi-

als, monitoring during the production process, and control of finished goods.

Products are supplied as a full set of refractory parts or as individual articles. The set of refractory pieces includes the following items:

- detachable drop-forming parts of the feeder (bowl, aperture, cylinder, plunger);
- refractories for the upper and the lower structure of the working channels and feeders (different types of burner stones, plates, beams, chutes, etc.).

Certain types of high-alumina refractory parts are shown in Fig. 1.

Electric glass-melting furnaces are becoming more common in the production of lead-containing and specialized glasses, and therefore, tin dioxide electrodes have widespread application in the glass industry. Application of tin oxide electrodes makes it possible to prevent reducing reactions in the glass melt, which is very important for the production of high-quality glass.

Consumers of tin oxide products are factories that manufacture products from lead-containing glass in various regions of Russia and foreign countries. In addition to block electrodes for electric glass melting, it is possible to produce



Fig. 1. High-alumina products.

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rod electrodes, thermocouple cases, drop-forming products, etc.

Electric-heated feeders have recently become widespread, which is due to a number of advantages, compared to gas-heated feeders. However, the feeders with immersed electrodes that are currently used do not always ensure the needed glass quality, due to local overheating of the glass melt, which can arise in the vicinity of the electrodes. The optimum variant is a feeder with a conducting lining, and the material for this lining can be a composite based on tin dioxide and refractory materials ( $\text{Al}_2\text{O}_3 \cdot \text{ZrO}_2$ , etc.).

The use of refractory wastes in the production of articles with prescribed properties, such as checker brick, holds considerable promise. Baddeleyite-corundum, mullite-corundum, and other refractory wastes can serve as corresponding additives.

Research is planned in the field of refractory concrete materials and production of special-purpose refractories.

Fulfillment of this and other projects will make it possible to improve the quality and resistance of refractory products and to increase their efficiency.